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طب بشري

OPHTHALMOLOGY



Lacrima Apparatus

Lecture No. **4**

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جروب ((C))

اللجنة العلمية لدفعة بصمة طبيب 31

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The Lacrimal apparatus

* Dry eyes ~

① Keratoconjunctivitis sicca : ~

Deficiency in the watering production & referred to some degree of dryness.

② Xerophthalmia : ~

dry eye & vit A deficiency & caused by a severe vit A deficiency is described by Pathologic dryness of cornea and conjunctiva.

③ Xerosis : ~

Referred to any ocular dryness and keratinization occur with severe conjunctival secretion : ~

eg:- chemical :- burn, acid, alkali

④ Sjogren's S : ~

Systemic disease affected mucin layer in all over the body :- dry eye & dry mouth & genital system in male or female.

* ttt of dry eye : ~ especially in children

① Vit A " Capsule " break it and put it in cornea.

② Antibiotic " Drops " :- ciprofloxacin . erythromycin then referred to pediatric doctor.

Pre corneal tear film : ~

Cornea :- is transparent , avascular , demyelinated innervation.

Composed of 5 layers :-

- ① Epithelium
- ② Bowman's mem
- ③ stroma is regular arrangement
- ④ Descemet memb
- ⑤ Endothelium « pump mechanism »

- (C)
- * Epithelium consist of 5 → 6 layers of stratified squamous non keratinized : — has a high regenerative power
 - * Epithelium consist of 3 layers of cells : —
 - ① Superficial cells : — 2 → 3 layers : flat or horizontal nucleated cells. The outermost layer has microvilli and microplacae to facilitate the adherence of the mucin layer of the tear film
« Hydrophilic layer »
 - ② Wing cells layer : — 2 layers : flattened polygonal shape.
 - ③ Basal cells : — single layer : responsible for regeneration the rest of epithelium layers.

- * The Pre corneal tear film made of 3 layers : —
 - ① Oily layer « The outer layer » : — Secreted from Meibomian gland and Zeis gland found within tarsus of the eyelid. Function : —
 - Prevents evaporation of tear.
 - lubrication of eye between conjunctiva & cornea and eyelid
- * Open in Gray line of the eye lid « surgical line ».
 - ② Watery layer « middle layer » : — secreted from main and accessory lacrimal glands : found in conjunctiva
Function : —
 - washing the debris and foreign body
 - Nutrition : — Take O_2 from the atmosphere & supply the outer layers of the cornea
 - contain lysozyme & immunoglobulins & protein & phospholipid.
 - mediator of inflammation.

* The inner layers of cornea supply from the aqueous of the Ant. chamber.

- ③ Mucin layer « Inner layer » : — secreted from
 - goblet's cell found in conjunctiva
 - glands of Henle's glands of Manz

Functions - Mucin secretion « change corneal epithelium from hydrophobic to hydrophilic $\Rightarrow$ enhances corneal wetting : thickness of this layer 0.1 μ m
 - Their ducts open into the 4 fornix.

- * So in dry eyes -
 + If deficiency in watery layer lead to $\Rightarrow$ Keratoconjunctivitis sicca.
 + " " " Mucin and Oily especially Mucin lead to $\Rightarrow$ Xerosis of cornea.

* Passage of aqueous depends on 3 things: -

- ① Normal blinking reflex
- ② Contact between external ocular surface and eyelid
- ③ Normal epithelium.

* Testing for function of aqueous secretion -
 - Schirmer's test -

Paper (35mm X 5mm) <

Puts into the junction of the medial $\frac{2}{3}$ & lateral $\frac{1}{3}$ of lower fornix for (5min) : -

exposed portion is moistened

with topical anesthesia

$\uparrow$ 6mm $\rightarrow$ normal

$\downarrow$ 6mm $\rightarrow$ abnormal

with out topical anesthesia

$\downarrow$ 10mm abnormal

$\uparrow$ 10mm normal

Lacrimal system: -

I Productive « secretory system » : -

- Main lacrimal gland

- accessory lacrimal gland.

II Lacrimal passage « excretory part »

I] Productive systems -

- ① main lacrimal gland :- (orbitopalpebral) > divided incompletely by levator aponeurosis into 2 parts :-
- 80% Large orbital portion found in lacrimal fossa.
 - 20% or less found in palpebral part.

surrounded by capsule $\Rightarrow$ if there is tumor in the gland, biopsy is contraindicated b2 Any trauma can change the tumor from benign to malignant and spread it.

* when the tumor occurs in one part, we can remove it and leave the other part

* Any tumor in epithelium usually benign but any tumor after basement membrane in connective tissue usually malignant « carcinoma » very dangerous.

$\Rightarrow$ Histology :-

each gland contains 2 type of cells :-

1. Acinar cell
2. Myoepithelial

$\Rightarrow$ Blood supply :-

Lacrimal artery which is a branch of ophthalmic Art.

$\rightarrow$ internal carotid Art $\rightarrow$ common carotid Art.

$\rightarrow$ In Rt side the common carotid arises from brachiocephalic

$\rightarrow$ In Lt side arises directly from arch of aorta so in children who have subacute endocarditis may lead to blindness b2 central retinal art occlusion of left eye by embolism.

$\Rightarrow$ Nerve supply :-

- Sympathetic nerve - ophthalmic division of the 5th n.
- Parasympathetic :- « cholinergic » from the sphenopalatine ganglion.

② accessory lacrimal gland :-

- glands of Krause: 40 in the upper lid
8 in the lower lid.

- Wolfring glands : 5 in upper border of upper tarsus

Some people born without main lacrimal gland or atresia in ducts & any destruction or removal of the main Lac gland doesn't lead to Xerosis as we can depend on the secretion of accessory gland.

- 95% of aqueous from the main Lac gland.

- 5-10% from the accessory Lac gland

II Lacrimal passage « excretory part » :-

① puncti

③ Lacrimal sac

② canaliculi

④ nasolacrimal duct.

after secretion of the aqueous from main Lac & It is drainage by 6 ducts arise from the orbital part of the gland & after traversing the palpebral part open in the lateral part of the upper fornix $\Rightarrow$ then it passes with accessory secretion from the upper & lower sulcus of eye lid « move from lateral to medial canthus until to reach superior & inferior puncti 50:50 $\Rightarrow$ to the upper & lower canaliculi « vertical part 2mm $\rightarrow$ horizontal part 6-7mm » $\Rightarrow$ Lacrimal sac 10-12mm $\Rightarrow$ nasolacrimal duct 18mm $\Rightarrow$ Opening in inferior meatus of the nose by a valve « Hasner's valve »

* if there is obstruction in puncti, atresia or stenosis especially in children !!! by trising operation

* Any disease in lacrimal drainage system we should take consultation from ENT doctor.

* Physiology of the lacrimal drainage : —

- During blinking the eye : « closed the eye »

It is done by :- orbicularis oculi muscle innervation by facial nerve, surrounding the lacrimal gland & ampullae, canaliculi & lacrimal sac. when close the eye the muscle compresses the ampullae, horizontal canaliculi and creating (+) pressure that forces tears down the nasolacrimal duct and into the nose.

- when the eyes open or elevator :-

It is done by :- ⊕ Levator palpebrae muscle innervation by Parasympathetic from 3rd nerve.

⊕ Muller's muscle innervation by Sympathetic.

when the eyes open, the canaliculi and sac expand creating (-) pressure that draws tears from the canaliculi into the sac.

* Causes of watering eye :-

- Epiphora :- caused by stenosis or block and ttt usually surgical.

- but « Lacrimation or hypersecretion caused by inflammation and ttt usually medical ».

- The most common cause of epiphora obstruction at any point along the drainage system.

* Nasolacrimal duct obstruction :-

Causes :- - Idiopathic most common.

- Naso-orbital trauma eg :- sinus surgery. - Tumours

- Granulomatous disease such as :- TB, leprosy, Syphilis, sarcoidosis and Wegener granulomatosis

* Treatment :-

- DCR « dacryocystorhinostomy »

Types :-

- ① Endoscopy from the eye :- The success rate is 50%
- ② Endolaser :- also the success rate is 50%
- ③ Traditional surgery :- External approach :- success rate is 90%

* Congenital obstruction :-

affects 20% of neonates

cause :- Congenital

- acquired :- Infect the mother during pregnancy by :- Hepatitis - HIV - gonococci - Chlamydia - Parachlamydia

* investigation :-

diagnostic tests :-

- ① Fluorescein test « Put a drop of Fluorescein in conjunctival sac & after 2 minutes ask the pt to blow his nose in clean handkerchief :-

- Green color is seen $\Rightarrow$ patent passage
- No green color is seen $\Rightarrow$ obstruction

- ② Regurge test :-

- Pull the eye lid out to feel medial palpebral ligament
- Ask the pt to look up to evert the punctum.
- Press by a little finger (or glass rod) on the Lac. sac below the medial pal. ligament « backwards, medially & upwards » against the lacrimal bone.

* (+ve) regurge $\Rightarrow$ upper segment obstruction « canalicular »

* (+ve) ~ $\Rightarrow$ Nasolacrimal duct obstruction

NB :- Normally regurge test is -ve

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③ Diagnostic syringing :-

dilatation the lower canaliculus then syringing & saline is done in the lower punctum by lacrimal canula.

* Regurge from upper punctum = Nasolacrimal duct obstruction by probing « hard stop » OR common canaliculus by probing « soft stop »

* Regurge from same punctum = lower canaliculus obstruction

④ Dacryocystography :-

Radio opaque dye « lipiodol » 1-2% is injected in the canaliculus and repeated X ray.

- Level of the dye is seen $\Rightarrow$ complete obstruction
- Rat tail appearance $\Rightarrow$ stenosis
- Delayed emptying $\Rightarrow$ failure of lacrimal pump
- Filling defects $\Rightarrow$ tumors.

* Prevention :- in infected mother the delivery by C.S.

* ttt :-

① 80% of cases are resolution by :-

- Topical antibiotic « drops » & massage 10 times / day .
- levofloxacin .
- gentamycin .
- erythromycin .

② 20% of cases treated by probing :-

- 80% of case after probing improve
- 20% no improvement so $\Rightarrow$ repeated probing after 3 months
- If no response ttt by DCR after 7 years.

* Congenital dacryocoele :-

is a collection of amniotic fluid or mucus in the lacrimal sac caused by an imperforate Hasner valve.

- D.D :- Mucocoele
- Trauma

- ttt :- Conservative ttt if fails in one month
Probing is adequate

* Acute dacryocystitis :-

- acute suppurative inflammation of the sac
- Symptoms and signs like abscess :-
Fever, Headach, Painful swelling
red, hot & tender

- ttt :-
- systemic antibiotic
 - Hot fomentation
 - Topical antibiotic
 - If there is fluctuation $\Rightarrow$ skin incision over the sac and drainage.

Prognosis :-

① Resolution $\Rightarrow$ Return to normal

② Change to chronic dacryocystitis $\Rightarrow$ ttt by OCR

* Chronic dacryocystitis

* Mucocoele $\Rightarrow$ expression of mucopurulent material.

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